Missouri Nursery Pest News

Office of the State Entomologist
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Avoiding Pests/Problems When Purchasing Plant Material

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This article is written to provide some helpful tips with regard to receiving and maintaining pest free nursery stock in your nursery or garden center. It is not intended to cover the topic of pest prevention or control in a comprehensive manner.

The first step in this process is to purchase quality plants from reputable suppliers. Starting with pest-free, quality stock is the easiest way to prevent your suppliers' pest problems from becoming problems for you and your customers. Secondly, maintaining your plants in a healthy condition through proper handling, watering, and fertilization will allow them to fight off many plant pests on their own.

Ask your suppliers specific questions about the type of pest prevention and control procedures in place at their facility. A great price on plant material isn't worth much when the plants have to be destroyed because of a serious pest.

I. When a shipment arrives

Before unloading plants, make sure you have:

- Itemized invoice with numbers, sizes and prices of plants
- Proof of inspection/certification of nursery from the state where the plants were grown (often includes state logo, copy of certification, copy of signature by state entomologist)
- *Quarantine Certificates* for stock from regulated areas (i.e., Gypsy Moth, Emerald Ash Borer, Asian Longhorned Beetle, Sudden Oak Death, Imported Fire Ant, Pine Shoot Beetle, Japanese Beetle). Quarantine and general pest information can be found at:

  National Plant Board web site: http://www.aphis.usda.gov/npb/

  National Agricultural Pest Information System (NAPIS): http://www.ceris.purdue.edu/napis/pests/index.html

It's a good practice to make notes on your invoice (especially if delivered by a commercial trucking company) such as date and time delivered and name of truck driver, general condition of plants.

Carefully inspect plant material upon arrival. Remember, you have the right to reject any material of questionable quality or when pests are present! Don't let the suppliers' problems become your problems! You can reduce the likelihood of introducing some especially harmful plant pests by buying from local sources.

II. Pests/Problems to look for on arriving plant material

Dormant Stock, Bulbs, Roots, etc.

- *Viability of stock* – plants should not be wrinkled and "dried out," roots should be bright in color and strongly attached to the crown
- *Insect/Disease Freedom*
    - heavy molds/mildews
    - cankered areas
    - galls
    - signs of insect infestation
        - *Borers* create holes in trunks, stems, branches (look for sawdust)
        - *Bulb mites* cause sunken areas on bulbs
        - *Grubs* (Japanese beetle, root weevils, chafers, etc.) can be found in the root ball of B&B plants and sod (many *container* plants are actually field grown and can have soil insect problems)
        - Root-infesting *nematodes* cause swollen gall-like growths on roots

Perennials, Small Shrubs and Trees

- *Foliar Nematodes* have become a more common problem in perennials, especially (but not limited to) plants which originate outside of the U.S., or are "grown out" near plants which do not originate from the U.S.
    - Difficult to detect early in the year; most commonly detected mid to late-summer causing blocky, angular areas within the leaf to yellow, become necrotic and may "fall out" (usually limited by major veins of the plant);
    - They can spread quickly in nurseries and gardens in free standing water;
    - Chemicals can suppress, but eradication is difficult.

- *Viruses,* especially *TOSPO virus complex* (tomato spotted wilt virus /impatiens necrotic spot virus), r*ose mosaic virus complex, and rose rosette virus*.
    - Plants with discolored lesions or leaves, yellow circular patterns (ringspots) or flecking in random patterns, irregular or stunted growth, unexplained curling of leaves are common signs of viruses;
    - May be transmitted by insects (western flower thrips spread TOSPO Virus), dirty pruners, or by using infected plants for grafting;
    - Infected plants should be destroyed (do not compost); there is no cure for virus infected plants.

- *Mildews;* most common are *powdery mildews* and *downy mildews*.
    - Once thought to just be unsightly, have been proven to slow plant growth at least 50% per year, and lead to death of plant in some cases.

Shrubs and Trees

- *Borers* create holes in tree trunks or branches, leaving behind "frass" or sawdust-like material from digested wood they have eaten. Large number of plants are quarantined or destroyed each year, due to borers. Borers are classified in several different categories; some are listed below

    - Beetles (Coleoptera)
        - *Roundheaded* (long-horned beetles, Family *Cerambycidae*)
            - *Roundheaded Appletree Borer*
                - usually found around crown of tree
                - wide host range, in particular, crabapple and hawthorns
                - *pushes out frass* which may appear pelletized
                - difficult to see in B&B material due to burlap covering site of injury
                - leaves a round exit hole
            - Other roundheaded borers to look for include the r*ed oak borer* (which enter on main trunk of oaks, sometimes near lowest branch crotch of tree), *pine sawyers* (which carry nematodes that cause pine wilt disease), and the *Asian longhorned beetle* (quarantine pest in Chicago, New York, and Toronto).

        - *Flatheaded* (metallic wood-boring beetles, Family *Buprestidae*)
            - leaves a "D" shaped exit hole
            - frass *remains packed* in feeding galleries
            - *Flatheaded appletree borer*
                - Will often cause bark to flake off trunk easily
                - Hosts include maples (especially liners), stressed fruit tree species (including ornamental pears), lindens, and dogwoods
        - *Agrilus spp.*
            - *Two-lined chestnut borer*
            - *Bronze birch borer*
                - causes raised tunnels under the bark on trunk of tree and larger branches
                - D-shaped exit hole
                - Frass remains tightly packed in feeding galleries
            - *Emerald ash borer*

    - Lepidoptera (adult borer is a moth)
        - Clearwing moths (easily monitored using pheromone traps)
            - Round exit holes

        - *Lilac/Ash borer*
        - *Peach tree borer*
            - attack *Prunus spp.* (i.e., sandcherry, plum) species, making them ooze a jelly-like substance which will have pieces of wood mixed in
        - *Dogwood borer*

    - Various other twig pruners and girdlers attack branches causing weakening and dieback

- *Scale insects* are found on many types of plants, some are species specific (i.e., *Liriope scale, pine needle scale, tulip tree scale, San Jose scale*) others can be found on a variety of plants (*Brown scale* on perennials and tropicals, *Chinese obscure scale* on many trees and shrubs)

- *Discolored areas* on needles/leaves are signs of previous or current pests

    - Spots on dogwood tree leaves could be *dogwood anthracnose* or *Septoria leafspot*
    - Brown banding on conifer needles can indicate disease
        - *Dothistroma* on Austrian pine
        - *Brown spot* on Scotch pine
    - Black specks in lines (following stomates) and purpling needles on lower branches can be an indication of *Rhizosphera needlecast* on spruce
    - White speckles on leaves could have been caused by *Spider mites, lacebugs, plant bugs* or other insects with piercing mouthparts
    - Leaf scorching could be a sign of environmental stress, herbicide burn, *verticillium wilt* or other infections

- *Egg Masses* can often be seen on twigs and branches

    - Destroy egg masses to prevent insect hatching
    - *Gypsy moth* egg masses (quarter-sized, light tan, velvety texture) are sometimes found on the main trunk or large branches of spruce trees and can be easily transported to uninfested areas (if found, call us or USDA immediately)
    - *Eastern tent caterpillar* egg masses are shiny, metallic in appearance and usually found on braches of *Prunus* species (sandcherry bush, cherry and plum trees)
    - *Bagworms,* overwintering bags carry the eggs for the next generation; often found on evergreens, in particular spruce and scotch pine

- *Root/crown-infesting insects* often go undetected until it's too late

    - Look for them in root balls of B&B stock and some container stock, especially *field grown* container plants
    - *Japanese beetle grubs* feed heavily on roots (adults feed on foliage)
        - Typical *C-shaped* white grubs
    - *Root weevil larvae: Black vine weevil, strawberry root weevil,* and others feed on roots and adults create *notches* on needles/leaves of *Taxus spp.* and *Rhododendrons*, in particular

        - Smaller (3/8 inch) C-shaped grubs
    - *Mealybugs* are found just below the soil line or in the crown of ornamental grasses

- *Twig galls,* such as *crown gall* (creeping Euonymous) are caused by a bacteria and plants should be rejected or destroyed
- Other galls, caused by insects such as g*outy oak gall* (Pin Oaks); plant should be rejected if heavily infested or pruned to remove galls
- *Cankers* indicate signs of stress or infection

III. Quarantine/Quality Pests

Certain plant pests are under federal and/or state quarantines which require specific measures to be met in order to move *regulated articles* out of the quarantine *(regulated)* area. Plants, and other regulated articles, coming from *regulated areas* should be accompanied by separate or additional paper certificates, stamps, or documentation that the material meets the requirements of the specific quarantine; however, proper documentation is *not a guarantee* of pest freedom. The following are some of the significant *quality* and *quarantine* pests (Federal) that we watch for, along with states or regions where they occur.

- Check NAPIS web site for information and distribution for many pests: http://www.ceris.purdue.edu/napis/pests/index.html#G

- *Gypsy moth* (Federal Quarantine)
    - Northeastern U. S., ranging from Maine south to North Carolina and west to *Michigan, northern Illinois, and Wisconsin*

- *Imported fire ant* (Federal Quarantine)
    - Generally throughout the Southeastern states, as far north as *northeastern Arkansas*
    - *Regulated area* includes all or parts of the following states: Alabama, Arkansas, California, Florida, Georgia, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and the territory of Puerto Rico

- *Asian Longhorned Beetle* (Federal Quarantine)
    - Area around Chicago, IL and New York City

- *Emerald Ash Borer* (Federal Quarantine)
    - Thirteen (13) counties in southeastern Michigan and Wood County, Ohio
    - There is a prohibition, in the lower peninsula of Michigan, on the movement of *all ash species*

- *Pine shoot beetle* (Federal Quarantine)
    - All or parts of Illinois, Indiana, Maine, Maryland, Michigan, Ohio, Pennsylvania, New Hampshire, New York, Vermont, West Virginia, and Wisconsin

- *Plum Pox Virus* (Federal Quarantine)
  - Adams County, Pennsylvania
  - Movement of certain *Prunus spp.* Prohibited

- *Japanese beetle*
  - Generally distributed in many states east of the Mississippi River; limited distribution in some states west of the Mississippi River

- *Dogwood Anthracnose*
  - Primarily eastern states (Appalachian region), some cases on west coast states

- *Noxious weeds*
  - Various states and species

  Visit the *National Plant Board* and *NAPIS* websites for further information:
  http://www.aphis.usda.gov./npb/
  http://www.ceris.purdue.edu/napis/pests/index.html#G

Foreign source plant material is also a concern as more and more plants are coming from outside the country, and often bringing pests along.

If you need assistance identifying a plant pest, contact your nursery inspector, the Missouri Department of Agriculture @ (573)751-5505 (Mike Brown, State Entomologist), county Extension office, or a UDSA/APHIS/PPQ office for information. Field staff are often not in the office or gone for several days into other areas. If no one can be reached, refrigerate or freeze insects or submerse them in an alcohol/water solution until contact is made. If possible, segregate plants of question to prevent further spread of pest.

Remember: Before using any chemical, always read the label carefully for directions on application procedures, appropriate rates, first aid, storage, and disposal. Make sure chemical is properly registered for use on the intended pest. Any products named are not intended as endorsements, nor is criticism implied of similar products that are not mentioned. These recommendations are based on observations and conditions in Missouri.